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"AS-BUILT" DESIGN SPECIFICATION  
FOR  
EQUIPROBABILITY ELLIPSES  
REPRESENTATION OF CLASSY CLUSTERS

Job Order 76-662

Prepared By

Lockheed Engineering and Management Services Company, Inc.  
Systems and Services Division  
Houston, Texas

Contract NAS 9-15800

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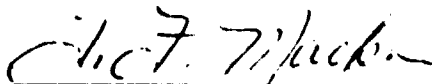
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HOUSTON, TEXAS

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## 1. SCOPE

This document describes the program to represent the CLASSY cluster distributions as equiprobability ellipses in brightness/greenness space.

The program is written exclusively in Fortran IV-G.



## 2. APPLICABLE DOCUMENTS

The following document forms a part of this specification:

TIRF 80-0012 Graphical Output of CLASSY Distribution Clusters.

### 3. SYSTEM DESCRIPTION

The Equiprobability Ellipses Program was designed and implemented to provide graphics output so that the cluster distributions estimated by CLASSY may be visualized. The approach is to project the hyper-ellipsoid for each cluster distribution onto the brightness greenness plane for each acquisition. This projection is done in two ways. The first projection corresponds to the selected brightness-greenness channels with the other channels unspecified. The second projection corresponds to a projection onto the selected brightness greenness channels with the other channels fixed at the mean value. Each of these projections produce an ellipse with the ellipse for the second projection contained in the ellipse for the first projection.

The equations for the two ellipses plotted for each cluster are as follows:

$$(1) (X_i - \mu_i)^2 \sigma_{ii}^{-1} + 2(X_i - \mu_i)(X_j - \mu_j) \sigma_{ij}^{-1} + (X_j - \mu_j)^2 \sigma_{jj}^{-1} = D$$

$$(2) (X_i - \mu_i)^2 \sigma^{ii} + 2(X_i - \mu_i)(X_j - \mu_j) \sigma^{ij} + (X_j - \mu_j)^2 \sigma^{jj} = D$$

Where

$$\sigma_{ii}^{-1} = \frac{\sigma_{jj}}{\sigma_{ii}\sigma_{jj} - \sigma_{ij}^2}$$

$$\sigma^{ij} = \frac{\sigma_{ij}}{\sigma_{ii}\sigma_{jj} - \sigma_{ij}^2}$$

and  $\sigma_{ij} = ij^{th}$  element of the cluster covariance matrix.

Note that  $\sigma^{ii}$  and  $\sigma^{ij}$  are elements of the matrix which is the inverse of the cluster covariance matrix.

D is a value to be selected by the user. The values for the mean vector, and inverse covariance matrix should be read from a data file produced by CLASSY.

The user may elect to plot one or both of the ellipses in the ellipse pair. The ellipse represented by equations (1) and (2) may be plotted two ways:

- (1) The program will plot the ellipse or ellipse pair for each cluster for a given acquisition on a single page using the same symbol for each ellipse pair for a given cluster. Each plot has the same scale.
- (2) The program will plot the ellipse or ellipse pair for each acquisition for a given cluster on four pages using the same symbol for each ellipse pair for a given acquisition. The user must reconstruct the 4 pages of plot data as one 2 page by 2 page plot. Each plot has the same scale.

The capability is implemented as a stand alone program with enough modularity so that it might be easily modified in the future. The output is generated on the line printer with user provided headings and axes for each plot. The program has the capability of handling up to 30 clusters and 6 acquisitions.

The driver program for the clustering system is Ellipses. The calculation subprograms are ACQICL to calculate the ellipses for all of the acquisitions for one CLASSY cluster and CL1ACQ to calculate the ellipses for all of the CLASSY clusters for one acquisition.

The plotting subroutines are PLOTPT which stores the points in the plot matrix, PLOTCL which prints the plot for one CLASSY cluster and PLOTAC which prints the plot for one acquisition.

CLASSY cluster data is read from the file by READCC and data for the current CLASSY cluster is stored by GETCC.

### 3.1 HARDWARE DESCRIPTION

The Equiprobability Ellipses Program is operational on the IBM 3031 at Purdue LARS under the CMS370 operating system. The program utilizes the IBM Fortran IV-G computer.

### 3.2 ELLIPSE EXEC FILE

ELLIPSE is called by the following EXEC file:

ELLIPSE (Segment number)

where segment number = number of segment.

### 3.3 SOFTWARE DESCRIPTION

#### 3.3.1 SOFTWARE COMPONENT NO. 1 (ELLIPSES)

ELLIPSES represents the CLASSY cluster distributions as equiprobability ellipses in brightness/greenness space.

##### 3.3.1.1 Linkages

ELLIPSES is the driver program. ELLIPSES calls ACQ1CL, CL1ACQ and READCC.

##### 3.3.1.2 Interface

The blank common block and /CC/ common block are used as interfaces with the subprograms.

##### 3.3.1.3 Inputs

TITLE	Blank Common	Plot title
XLABEL	Blank Common	Label for X axis
YLABEL	Blank Common	Label for Y axis
D	Blank Common	Computational constant
STARTX	Blank Common	Starting X value
IGROUP	Blank Common	Option for group of ellipses
IOPT	Blank Common	Option for outer or inner ellipses
MQ	/CC/	Number of channels
IOUT	/CC/	Printer unit
ICLUNT	/CC/	CLASSY data unit

##### 3.3.1.4 Output

Same as input.

##### 3.3.1.5 Storage Requirements

Not applicable.

#### 3.3.1.6 Description

This program establishes the user requirements for the representation of the CLASSY cluster distributions and calls the subroutines to calculate the points of the ellipse and create plots on the line printer.

#### 3.3.1.7 Flowchart

Not applicable.

#### 3.3.1.8 Listing

See Appendix A for program.

### 3.3.2 SOFTWARE COMPONENT NO. 2 (ACQ1CL)

ACQ1CL calculates the y values for 60 x values for the acquisitions (sets of greenness and brightness values) for one CLASSY cluster and calls subprograms to store data in the plot and print the plot.

#### 3.3.2.1 Linkages

ACQ1CL is called by ELLIPSES. ACQ1CL calls GETCC, MINV, PLOTPT and PLOTCL.

#### 3.3.2.2 Interfaces

The blank common block and /CC/ common block are used as interface between ACQ1CL and ELLIPSES and the subprograms. A calling sequence is used for interface with MINV.

#### 3.3.2.3 Inputs

MQ	/CC/	Number of channels
NOCC	/CC/	Number of CLASSY clusters
CVKIN	/CC/	Inverse of CLASSY covariance matrix
CCOVAR	Calling Sequence	CLASSY covariance matrix
CMEANS	/CC/	Means for CLASSY clusters
D	Blank Common	Computational constant

#### 3.3.2.4 Outputs

Y1	Blank Common	Y value for outer ellipse
Y2	Blank Common	Y value for outer ellipse
Z1	Blank Common	Y value for inner ellipse
Z2	Blank Common	Y value for inner ellipse
LINE	Blank Common	Matrix filled with blanks

#### 3.3.2.5 Storage Requirements

Not applicable.

#### 3.3.2.6 Description

For each CLASSY cluster the following events occur. Each set of greenness and brightness values are used to calculate ellipses using the covariance matrices and means for the CLASSY cluster using the formulas given in 3.0. The subprogram PLOTPT is called to store the points in the plot array, and PLOTAC is called to print the plots.

#### 3.3.2.7 Flowchart

Not applicable.

#### 3.3.2.8 Listing

See Appendix A for program.



### 3.3.3 SOFTWARE COMPONENT NO. 3 (CL1ACQ)

CL1ACQ calculates the y values for 60 x values for the CLASSY clusters for one acquisition (set of greenness and brightness values) and calls subprograms to store data in plot and print plot.

#### 3.3.3.1 Linkages

CL1ACQ is called by ELLIPSES. CL1ACQ calls GETCC, MINV, PLOTPT and PLOTCL.

#### 3.3.3.2 Interfaces

The blank common block and /CC/ common block are used as interface between CL1ACQ and ELLIPSES and the subprograms. A calling sequence is used for interface with MINV.

#### 3.3.3.3 Inputs

MQ	/CC/	Number of channels
NOCC	/CC/	Number of CLASSY clusters
CVRIN	/CC/	Inverse of CLASSY covariance matrix
CCOVAR	Blank Common	CLASSY covariance matrix
CMEANS	/CC/	Means for CLASSY clusters
D	Blank Common	Computational constant

#### 3.3.3.4 Outputs

Y1	Blank Common	Y value for outer ellipse
Y2	Blank Common	Y value for outer ellipse
Z1	Blank Common	Y value for inner ellipse
Z2	Blank Common	Y value for inner ellipse
LINE	Blank Common	Matrix filled with blanks

#### 3.3.3.5 Storage Requirements

Not applicable

#### 3.3.3.6 Description

For each acquisition the following events occur. Each set of greenness and brightness values are used to calculate ellipses using the covariance matrices and means for the CLASSY cluster using the formulas given in 3.0. The subprogram PLOTPT is called to store the points in the plot array, and PLOTAC is called to print the plots.

#### 3.3.3.7 Flowchart

Not applicable.

#### 3.3.3.8 Listing

See Appendix A for program.

### 3.3.4 SOFTWARE COMPONENT NO. 4 (PLOTPT)

PLOTPT stores the symbols for the ellipses in the matrix LINE.

#### 3.3.4.1 Linkages

PLOTPT is called by ACQ1CL and CL1ACQ.

#### 3.3.4.2 Interface

The blank common block is used as interface with the calling subprograms.

#### 3.3.4.3 Inputs

IGROUP	Blank Common	Plot ellipse indicator
Y1	Blank Common	Y value for outer ellipse
Y2	Blank Common	Y value for outer ellipse
Z1	Blank Common	Z value for inner ellipse
Z2	Blank Common	Z value for inner ellipse
LINE	Blank Common	Matrix for line symbols

#### 3.3.4.4 Outputs

LINE Matrix containing symbols for points on plots.

#### 3.3.4.5 Storage Requirements

Not applicable.

#### 3.3.4.6 Description

This subroutine stores symbols for the ellipses in the matrix LINE depending on which ellipses are requested.

### 3.3.5 SOFTWARE COMPONENT NO. 5 (PLOTAC)

PLOTAC prints a plot for displaying the CLASSY cluster ellipses for one acquisition.

#### 3.3.5.1 Linkages

PLOTAC is called by CL1ACQ.

#### 3.3.5.2 Interface

Interface is accomplished through blank common and /CC/ common blocks.

#### 3.3.5.3 Input

STARTX	Blank Common	Starting value for X axis
LINE	Blank Common	Matrix of plot values
TITLE	Blank Common	Title for plot
XTITLE	Blank Common	X label for plot
YTITLE	Blank Common	Y label for plot
NOCC	/CC/	Number of CLASSY clusters
NOCHAN	/CC/	Number of current channel

#### 3.3.5.4 Output

Plot written on line printer.

#### 3.3.5.5 Storage Requirement

Not applicable.

#### 3.3.5.6 Description

PLOTAC prints the plot title, prints the lines of plot data including the Y axis label and prints the label for the X axis for 2 plot halves.

3.3.5.7 Flowchart

Not applicable.

3.3.5.8 Listing

See Appendix A for program.

### 3.3.6 SOFTWARE COMPONENT NO. 6 (PLOTCL)

PLOTCL prints a plot for displaying the acquisition ellipses for one CLASSY cluster.

#### 3.3.6.1 Linkages

PLOTCL is called by ACQ1CL.

#### 3.3.6.2 Interface

Interface is accomplished through blank common and /CC/ common blocks.

#### 3.3.6.3 Input

STARTX	Blank Common	Starting value for X axis
LINE	Blank Common	Matrix of plot values
TITLE	Blank Common	Title for plot
XTITLE	Blank Common	X label for plot
YTITLE	Blank Common	Y label for plot
NOCC	/CC/	Number of CLASSY clusters
NOCHAN	/CC/	Number of current channel

#### 3.3.6.4 Output

Plot written on line printer.

#### 3.3.6.5 Storage Requirement

Not applicable.

#### 3.3.6.6 Description

PLOTCL prints the plot title, prints the lines of plot data including the Y axis label and prints the label for the X axis for 1 plot.

3.3.6.7 Flowchart

Not applicable.

3.3.6.8 Listing

See Appendix A for program.

### 3.3.7 SOFTWARE COMPONENT NO. 7 (READCC)

READCC reads the CLASSY cluster data.

#### 3.3.7.1 Linkage

READCC is called from ELLIPSES.

#### 3.3.7.2 Interface

Interface is accomplished through the /CC/ common block.

#### 3.3.7.3 Input

IOUT	/CC/	Printer unit
ICLUNT	/CC/	Unit for CLASSY data file
INQ	/CC/	Number of channels

#### 3.3.7.4 Output

RLPRP	/CC/	Relative proportion array
CCVLRT	/CC/	Normalization factor element
CDCON	/CC/	Normalization factor element
CCMEANS	/CC/	Cluster means array
CCVRIN	/CC/	Covariance matrix
NOCC	/CC/	Number of CLASSY clusters

#### 3.3.7.5 Storage Requirements

Not applicable.

#### 3.3.7.6 Description

READCC reads the CLASSY cluster values into common block /CC/. The number of sets of CLASSY cluster information is saved in NOCC.



3.3.7.7 Flowchart

Not applicable.

3.3.7.8 Listing

See Appendix A for program.

### 3.3.8 SOFTWARE COMPONENT NO. 8 (GETCC)

Move one set of CLASSY data from arrays to corresponding scalars.

#### 3.3.8.1 Linkage

GETCC is called from GETCC.

#### 3.3.8.2 Interface

Interface is accomplished through blank common and /CLASSY/ blocks.

#### 3.3.8.3 Input

ICC      /blank common/      current class

#### 3.3.8.4 Output

RELPRP	/blank common/	Relative proportion
CVOLRT	/blank common/	Normalization factor element
CMEANS	/blank common/	Classy cluster mean array
CVRIN	/blank common/	Covariance matrix
DCON	/blank common/	Normalization factor element

#### 3.3.8.5 Storage Requirement

Not applicable.

#### 3.3.8.6 Description

GETCC moves data for this specified class from the arrays of CLASSY data.

#### 3.3.8.7 Flowchart

Not applicable.

#### 3.3.8.8 Listing

See Appendix A for program.

### 3.3.9 SOFTWARE COMPONENT NO. 9 (MINV)

MINV calculates the inverse and determinant of the input matrix.

#### 3.3.9.1 Linkages

MINV is called by ACQ1CL and CL1ACQ.

#### 3.3.9.2 Interfaces

Interface is accomplished through calling arguments and common block /CC/.

#### 3.3.9.3 Input

MQ	/CC/	Number of channels
B	Calling Argument	Scratch area
C	Calling Argument	Matrix to be inverted

#### 3.3.9.4 Output

A	Calling Argument	Inverted matrix
VOL	Calling Argument	Determinant of C

#### 3.3.9.5 Storage Requirement

Not applicable.

#### 3.3.9.6 Description

MINV calculates  $A = \text{inverse of } C$  and VOL the determinate of C.

#### 3.3.9.7 Flowchart

Not applicable.

#### 3.3.9.8 Listing

See Appendix A for program.

#### 4. OPERATION

ELLIPSES is operational on the IBM 3031 computer at LARS, West Lafayette Indiana.

The program and EXEC files can be loaded from tape 3956, file 6.

ELLIPSES is executed by entering the following command after signing on the computer system.

ELLIPSES (Segment Number)

where Segment Number = number of the segment.

Control information is defined by interactive dialogue with the user.

Text output is on the terminal and line printer which are assigned in the EXEC.

APPENDIX A  
LISTINGS OF MAXLABEL PROGRAMS

A-1

C PURPOSE: REPRESENT THE CLUSTER DISTRIBUTIONS OUTPUT BY CLASSY  
C AS EQUIPHORABILITY ELLIPSES IN BRIGHTNESS/WEENESS SPACE

COMMON Y1(300), Y2(300), Z1(300), Z2(300), D, LUMANS(16),

1 TITLE(20), VLABEL(20), VLABEL(20), LINE (240,150),

2 SCRTCH(16,16), CCVOR(16,16), SIGSH(2,2), SIGSH(2,2), SIGSH(2,2),

3 ANACT, ANOCHAN, ANOCHN2, STARTA, SIGROUP, IERKOR, INPT, ISYVAL

COMMON ACC, NOCC, NOCAT, ITOTOT, MOP4, MNS, ICC,

1 TOLUNT, TOUT, CAINAM(20), UCUN,

2 IOUTS(20,20), CVOLMT, WLPMT(30), CMFANS(16), CVRIM(15H),

3 IOUT(30,20), HAP(30), NGTUT(16), LAHLS(30), LHCSS(30),

4 HETLA(20,30), GELA(20,30), SLK(20,30), SK(30), LHCST(30)

C LOGICAL\*1 LABELS, LHCSS, LHCST, LINE, ISYVAL, JSYM

C DATA XA/YA//K/C//, KU/0//, RI/1//, KM/0.3//

C \*\*\*\*\* READ TITLE AND AXES LABELS \*\*\*\*\*

WRITE (5,100)

FORMAT (1,100)

100 READ (5,110) TITLE

110 FORMAT (20A4)

111 WRITE (6,111) TITLE

FORMAT (2X,20A4)

WRITE (3,120)

FORMAT (3,120)

120 READ (5,130) VLABEL

130 WRITE (6,130) VLABEL

FORMAT (1,130)

130 READ (5,140) VLABEL

140 WRITE (6,140) VLABEL

FORMAT (1,140)

140 READ (5,150) VLABEL

150 WRITE (6,150) VLABEL

FORMAT (1,150)

150 READ (5,160) VLABEL

160 WRITE (6,160) VLABEL

FORMAT (1,160)

160 READ (5,170) VLABEL

170 WRITE (6,170) VLABEL

FORMAT (1,170)

170 READ (5,180) VLABEL

180 WRITE (6,180) VLABEL

FORMAT (1,180)

180 READ (5,190) VLABEL

190 WRITE (6,190) VLABEL

FORMAT (1,190)

190 READ (5,200) VLABEL

200 WRITE (6,200) VLABEL

FORMAT (1,200)

PL000010

PL000020

PL000030

PL000040

PL000050

PL000060

PL000070

PL000080

PL000090

PL000100

PL000110

PL000120

PL000130

PL000140

PL000150

PL000160

PL000170

PL000180

PL000190

PL000200

PL000210

PL000220

PL000230

PL000240

PL000250

PL000260

PL000270

PL000280

PL000290

PL000300

PL000310

PL000320

PL000330

PL000340

PL000350

PL000360

PL000370

PL000380

PL000390

PL000400

PL000410

PL000420

PL000430

PL000440

PL000450

ORIGINAL PAGE IS  
OF POOR QUALITY

14/11/55

DATE = 80142

**PLUT**

FORTRAN IV G LEVEL 21

**FILE PLOT**

FIGURE / LAWS 3031

```

00047 ***** ENTER NUMBER OF CHANNELS *****
00048 WRITE (3,170)
00049 FORMAT (6,170)
00050 WRITE (6,170)
00051 WRITE (5,180) (M)
00052 WRITE (6,181) (M)
00053 FORMAT (12)
00054 FORMAT (18)
00055
00056 C SFT CHANNELS FOR GROUPS
00057
00058 WRITE (3,185)
00059 WRITE (6,186)
00060 FORMAT (1, ENTER GROUPS OF CHANNELS AS 2 DIGIT NUMBERS,
00061 /, EXAMPLE: 01-05,06-08,09-07)
00062 READ (5,187) (ICHANS(I), I=1,16)
00063 FORMAT (16,12,1X)
00064 WRITE (6,188) (ICHANS(I), I=1,16)
00065 FORMAT (16,12,1X)
00066
00067 C COUNT ACTIVE CHANNELS
00068 DO 190 I = 1,16
00069 IF (ICHANS(I) .EQ. 0) GO TO 192
00070 MACT = MACT + 1
00071 CONTINUE
00072 IF (ICHANS(1) .NE. 0) GO TO 200
00073
00074 C ALL CHANNELS ENTERED, USE DEFAULT
00075 DO 195 I = 1,16
00076 ICHANS(I) = 1
00077 IMACT = 0
00078 IF (MACT .EQ. 2) .AND. 0) MACT = MACT - 1
00079 CONTINUE
00080
00081 ***** INITIALIZE CONSTANTS *****
00082 IMACT = 6
00083 ICLUMP = 23
00084
00085 ***** CALL SUBROUTINES *****
00086 CALL INFORMATION ON CLASSY CLUSTERS
00087 CALL READCC
00088
00089 C
00090 C CALCULATE VALUES FOR CLASSY CLUSTER OR FOR ACQUISITIONS
00091 IF (1 GROUP .EQ. 14) CALL ACQCL
00092 IF (1 GROUP .EQ. 15) CALL CLCLCC
00093 STOP
00094 END

```

COMMON BLOCK /			MAP SIZE			ABE1			
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
Y1	1204	Y1	440	KLABEL	960	Y2	510	LINE	1200
Y11K	1304	KLABEL	1354	YLABEL	1354	Y11K	13A4	SIGNS	13F4
COVNU	1404	NOCHN2	48CC	STARTX	4800	COVNU	4100	STARTX	48B4
NOCHN	1504	ISYMR	48F0			NOCHN	4100	STARTX	48B4
Y11K	1604					Y11K	4100	STARTX	48B4
Y11K	1704					Y11K	4100	STARTX	48B4
Y11K	1804					Y11K	4100	STARTX	48B4
Y11K	1904					Y11K	4100	STARTX	48B4
Y11K	2004					Y11K	4100	STARTX	48B4
Y11K	2104					Y11K	4100	STARTX	48B4
Y11K	2204					Y11K	4100	STARTX	48B4
Y11K	2304					Y11K	4100	STARTX	48B4
Y11K	2404					Y11K	4100	STARTX	48B4
Y11K	2504					Y11K	4100	STARTX	48B4
Y11K	2604					Y11K	4100	STARTX	48B4
Y11K	2704					Y11K	4100	STARTX	48B4
Y11K	2804					Y11K	4100	STARTX	48B4
Y11K	2904					Y11K	4100	STARTX	48B4
Y11K	3004					Y11K	4100	STARTX	48B4
Y11K	3104					Y11K	4100	STARTX	48B4
Y11K	3204					Y11K	4100	STARTX	48B4
Y11K	3304					Y11K	4100	STARTX	48B4
Y11K	3404					Y11K	4100	STARTX	48B4
Y11K	3504					Y11K	4100	STARTX	48B4
Y11K	3604					Y11K	4100	STARTX	48B4
Y11K	3704					Y11K	4100	STARTX	48B4
Y11K	3804					Y11K	4100	STARTX	48B4
Y11K	3904					Y11K	4100	STARTX	48B4
Y11K	4004					Y11K	4100	STARTX	48B4
Y11K	4104					Y11K	4100	STARTX	48B4
Y11K	4204					Y11K	4100	STARTX	48B4
Y11K	4304					Y11K	4100	STARTX	48B4
Y11K	4404					Y11K	4100	STARTX	48B4
Y11K	4504					Y11K	4100	STARTX	48B4
Y11K	4604					Y11K	4100	STARTX	48B4
Y11K	4704					Y11K	4100	STARTX	48B4
Y11K	4804					Y11K	4100	STARTX	48B4
Y11K	4904					Y11K	4100	STARTX	48B4
Y11K	5004					Y11K	4100	STARTX	48B4
Y11K	5104					Y11K	4100	STARTX	48B4
Y11K	5204					Y11K	4100	STARTX	48B4
Y11K	5304					Y11K	4100	STARTX	48B4
Y11K	5404					Y11K	4100	STARTX	48B4
Y11K	5504					Y11K	4100	STARTX	48B4
Y11K	5604					Y11K	4100	STARTX	48B4
Y11K	5704					Y11K	4100	STARTX	48B4

COMMON BLOCK /CC			MAP SIZE			C4A2			
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
NUCC	4	NOCAT	H	ITOTDT	C	MUP4	10	ITOTDT	10
IC	14	ICLUNT	IC	ICLUNT	20	ICLUNT	24	ICLUNT	24
QCON	73	ICLUTS	7C	CVOLWT	41CC	ALPMP	4100	ALPMP	4100
QCON	4243	PR	4200	MAP	46F3	DOTDT	4770	DOTDT	4770
QCON	17CE	META	47EC	META	314C	SLK	MAAC	SLK	MAAC
LFLCST	C484								

SYMPROGRAMS CALLED			LOCATION		
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
PFADCC	FC	ACUICL	100	CL1AC3	104

SCALEW MAP			LOCATION		
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
KC	114	K0	118	K1	11C

FORMAT STATEMENT MAP			LOCATION		
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
110	134	111	13E	120	146
300	135	142	140	144	14A
151	164	170	170	14C	14C
157	163	184	184	14C	14C

LOCATION			LOCATION		
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
100	12E	130	159	130	159
140	164	150	14A	150	150
160	204	131	14C	131	131
186	204		14C		

```

*OPTIONS IN EFFECT* 10=HCGJCS,5=PRCE,NO=LST,PRCK=COLJAD,MAP
*OPTIONS IN EFFECT* NAME=PL01 * LINEGN1=1/2
*STATISTICS* SOURCE STATISTICS=74=PROGRAM SIZE =
*STATISTICS* NO DIAGNOSTICS GENERATED

```

ORIGINAL FACTS  
OF POOR QUALITY





```

0040      Z1(I) = 0.
0041      Z2(I) = 0.
0042      CONTINUE
0043      A1 = SIGSHI (2.2)
0044      A2 = SIGSHO (2.2)

C      CALC CONSTANT TERMS
0045      UGREEN = CMEANS (IGREEN)
0046      UWHIT = CMEANS (IWHIT)
0047      WTE241 = 2 * UWHIT * SIGSHI (2.2)
0048      WTE242 = 2 * UWHIT * SIGSHO (2.2)

C      CALC UGREEN**2 * SIGMA (2.2)
0049      G1 = UGREEN * UGREEN * SIGMA (2.2)
0050      G2 = UWHIT * UWHIT * SIGSHO (2.2)

C      CALC VALUES FOR X = 1.249*2
0051      N1100 = 1
0052      I1000 = 1
0053      X1 = STAPIX * (1-1) * .25
0054      DIFFXU = XX - UGREEN**2 * SIGMA (1.1)
0055      F1 = DIFFXU * DIFFXU * SIGSHI (1.1)
0056      F2 = DIFFXU * DIFFXU * SIGSHO (1.1)

C      CALC 2(X - UGREEN) * (-UWHIT) * SIGMA (1.2)
0057      F1 = 2 * DIFFXU * (-UWHIT) * SIGMA (1.2)
0058      F2 = 2 * DIFFXU * (-UWHIT) * SIGSHO (1.2)

C      F = F + 2 * DIFFXU * X * SIGMA (1.2) + (X**2) * SIGMA (2.2) - 2 * UWHIT * WTE241
0059      V = -1 * F - SORT (F**2 - 4AC) / 2A
0060      A1 = 2 * DIFFXU * SIGSHI (1.2) - WTE241
0061      A2 = 2 * DIFFXU * SIGSHO (1.2) - WTE242
0062      C1 = F1 + F1 + G1 - 0
0063      C2 = F2 + F2 + G2 - 0

C      CALC C**2 = 4AC * IF NEGATIVE DO NOT USE X VALUE
0064      C1 = 4A1 * A1 - 4 * A1 * C1
0065      IF (C1 < 0) GO TO 1000
0066      C2 = 4A2 * A2 - 4 * A2 * C2
0067      IF (C2 < 0) GO TO 1000
0068      V1(I) = (-A1 + SQRT(C1)) / (2 * A1)
0069      V2(I) = (-A2 + SQRT(C2)) / (2 * A2)

C      COMPUTE SCATTER PLATES * IF SCATTER PLATES IS 0
0070      IF (SCATPLT = 0) GO TO 1000
0071      SCATPLT = SORT (SCATPLT)
0072      Z1(I) = (-A1 + SQRT(C1)) / (2 * A1)
0073      Z2(I) = (-A2 + SQRT(C2)) / (2 * A2)

C      1000 CONTINUE

C      ***** SAVE VALUES OF PLOT LINES *****
0074      I5000 = J5000 (1111)
0075      CALL PLOTPT

C      ***** WITH PLOT *****
0076      CALL PLOT
0077      CALL PLOTAC
0078      CALL PLOTAF
0079      RETURN
0080

```

PL001940  
 PL001950  
 PL001960  
 PL001970  
 PL001980  
 PL001990  
 PL002000  
 PL002010  
 PL002020  
 PL002030  
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 PL002060  
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## FILE PLOT

PURPOSE / LARS 3031

```

0001      SUBROUTINE PLOTPT
0002      C PURPOSE: STORE POINTS OF ELLIPSE ON GRAPH
0003      C
0004      C COMMON Y1(300), Y2(300), Z1(300), Z2(300), D, ICHANS(16),
0005      1 TITLE(20), ALABEL(20), XLABEL(20), LIND(20,150),
0006      2 SCRT(16,16), CCVM(16,16), SIGSR(2,2), SIGSH(2,2), SIGSM(2,2),
0007      3 *WACT, NOCHAN, NOCHN2, STAR1A, IGROUP, IFR20R, IFR1, ISYML
0008      CO4WV, ZCC, W3, WCC, NOCAT, ITOTUT, WDP4, WDS, ICC,
0009      1 ICLUNT, IJUNT, IOUT, CATNAM(20), UCUN,
0010      2 IUT(20,20), CVOLPT, WLP(30), CMENS(16), CWMIN(154),
0011      3 PR(20,20), WAP(30), DUTUT(16), LABELS(30), LMLCS(30),
0012      4 *ETA(20,30), *ETA(20,30), SLK(20,30), SK(30), LMLCST(30),
0013      LOGICAL *1 LABELS, LMLCS, LMLCST, LINE, ISYML, JSYM, IOUT
0014      C DATA XA/0.0, KC/0.0, KU/0.0, KI/1.0,
0015      C DATA IOUT /0.0/
0016      C ***** CHECK BOUNDS AND SOME POINTS IN ARWAY LINE *****
0017      IF (LBOUND(10, 1) .GT. 1)
0018      C ELLIPSE FOR EACH CLASSY CLUSTER. SPREAD THEM OUT 0.4 PAGES
0019      MAX = 240
0020      XSCALE = 25
0021      YMAX = 150
0022      YSCALE = 333333
0023      GO TO 20
0024      C ELLIPSE FOR EACH SET OF ORBITERS AND MIGHTLESS CHANNELS. USE 1 PAGE
0025      MAX = 120
0026      XSCALE = 5
0027      YMAX = 70
0028      YSCALE = 1
0029      GO TO 20
0030      C
0031      DO 200 I = 1, MAX
0032      MDEAY = 1
0033      MDEAY = Y1(I) / YSCALE
0034      IF (MDEAY .EQ. 0) GO TO 100
0035      IF (MDEAY .GT. 0.4) MDEAY = 0.4
0036      YMAX = 50 TO 50
0037      C
0038      C POINT OUT OF RANGE
0039      X = SIGSTA * (I-1) * XSCALE
0040      Y = Y1(I)
0041      X = 110, (540) * X, Y
0042      IF (X .GT. 100) GO TO 100
0043      IF (X .GT. 100) GO TO 100
0044      C
0045      C STORE POINTS IN ORBITER ELLIPSE, ORBITERS ONLY THREE ELLIPSE REQUESTED
0046      IF (I .GT. 100) GO TO 100
0047      IF (I .GT. 100) GO TO 100
0048      MDEAY = Y2(I) / YSCALE
0049      IF (MDEAY .GT. 0.4) MDEAY = 0.4
0050      YMAX = 50 TO 100
0051      C
0052      C STORE POINTS IN ORBITER ELLIPSE, ORBITERS ONLY THREE ELLIPSE REQUESTED
0053      IF (I .GT. 100) GO TO 100
0054      IF (I .GT. 100) GO TO 100
0055      MDEAY = Z1(I) / YSCALE
0056      IF (MDEAY .GT. 0.4) MDEAY = 0.4
0057      YMAX = 50 TO 200
0058      C
0059      C STORE POINTS IN ORBITER ELLIPSE, ORBITERS ONLY THREE ELLIPSE REQUESTED
0060      IF (I .GT. 100) GO TO 100
0061      IF (I .GT. 100) GO TO 100
0062      MDEAY = Z2(I) / YSCALE
0063      IF (MDEAY .GT. 0.4) MDEAY = 0.4
0064      YMAX = 50 TO 200
0065      C
0066      C
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FORTRAN IV G LEVEL. 21

FILE PLOT

0041  
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0043  
0044

PLOTP

DATE = R0142

PURDUE / LAWS 3031

IF (MODIA .EQ. 1) LINE (INDEX,INDEX4) = IUOT

200

CONTINUE  
PRINT  
END

14/11/55

PAGE 0002

PL004690  
PL004700  
PL004710  
PL004720

FORTRAN IV G LEVEL 21  
FILE PLOT

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DATE = 40142

14/11/55

PAGE 0003

PUMDUE / LARS 3031

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
Y1	120	Y2	130	Y3	140	Y4	150	Y5	160
Y6	170	Y7	180	Y8	190	Y9	200	Y10	210
Y11	220	Y12	230	Y13	240	Y14	250	Y15	260
Y16	270	Y17	280	Y18	290	Y19	300	Y20	310
Y21	320	Y22	330	Y23	340	Y24	350	Y25	360
Y26	370	Y27	380	Y28	390	Y29	400	Y30	410
Y31	420	Y32	430	Y33	440	Y34	450	Y35	460
Y36	470	Y37	480	Y38	490	Y39	500	Y40	510
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Y46	570	Y47	580	Y48	590	Y49	600	Y50	610
Y51	620	Y52	630	Y53	640	Y54	650	Y55	660
Y56	670	Y57	680	Y58	690	Y59	700	Y60	710
Y61	720	Y62	730	Y63	740	Y64	750	Y65	760
Y66	770	Y67	780	Y68	790	Y69	800	Y70	810
Y71	820	Y72	830	Y73	840	Y74	850	Y75	860
Y76	870	Y77	880	Y78	890	Y79	900	Y80	910
Y81	920	Y82	930	Y83	940	Y84	950	Y85	960
Y86	970	Y87	980	Y88	990	Y89	1000	Y90	1010
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Y101	1120	Y102	1130	Y103	1140	Y104	1150	Y105	1160
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Y186	1970	Y187	1980	Y188	1990	Y189	2000	Y190	2010
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Y566	5770	Y567	5780	Y568	5790	Y569	5800	Y570	





14/11/75

DATE = 80142

PL0TCL

FORTRAN IV 6 LEVEL 21

FILE PLOT PURDUE / LAWS 3031

```

0001      SUBROUTINE PLOTCL
0002      C PURPOSE: PRINT PLOT FOR ALL CLASSY CLUSTERS FOR 1 ACQUISITION
0003      C
0004      C COMMON Y1(300), Y2(300), Z1(300), Z2(300), D, ICHANS(15),
0005      C 1 TITLE(20), XLABEL(20), YLABEL(20), LINE(240,150),
0006      C 2 SCATCH(15,15), COVAR(2,2), SIGMA(2,2), SIGSHI(2,2), SIGSHO(2,2),
0007      C 3 *MAGN, *NOCHAN, *NOCC, *STARTX, *TGROUP, *IFK40, *IOP, *ISYML
0008      C 4 *MAGN, *CC, *M, *NOCC, *NOCAT, *ITOT, *MUP4, *MUS, *ICC,
0009      C 1 ICLUNT, IDUNT, IDU1, CALMA4(20), UCUM,
0010      C 2 IOPYS(20,204), CYCLWT, KLP4(30), CMFANS(16), CVMTH(15A),
0011      C 3 P4(30,204), B4(30), DOTUT(16), LAFLS(30), LFLCSS(30),
0012      C 4 MET4(20,30), OMET4(20,30), SLK(20,30), SK(30), LBLCSY(30)
0013      C
0014      C LOGICAL*1 LABELS, LFLCSS, LFLCST, LINE, ISYML, YTITLE
0015      C
0016      C DIMENSION YTITLE(M),
0017      C EQUIVALENCE (YTITLE, YLABEL)
0018      C
0019      C ***** WHITE TITLE *****
0020      C WRITE (6,100) TITLE
0021      C FORMAT (1H,19X,20A4)
0022      C
0023      C ***** WHITE LINES *****
0024      C Y1AX = 70
0025      C D3400 Y1 = 1,1Y1AX
0026      C WRITE (6,200) YTITLE(1Y), Y1, (LINE(1Y,1Y), 1A=1,120)
0027      C FORMAT (1Y, 11, 2A, 12, 2A, 150A1)
0028      C CONTINUE
0029      C
0030      C ***** X AXIS *****
0031      C ISYML = START,
0032      C IFND = ISYML + 20
0033      C WRITE (6,350) (1A, 1A=ISYML+1, 1A=2)
0034      C FORMAT (5X,3(14)
0035      C 1)
0036      C WRITE (6,400) XL34FL
0037      C FORMAT (///,20X, 20A4)
0038      C WRITE (6,400) M, ICC
0039      C
0040      C FORMAT (///,20X,12, CHANNELS, CLASSY CLUSTER 1,12)
0041      C
0042      C RETURN
0043      C END

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SYMBOL Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y20 Y21 Y22 Y23 Y24 Y25 Y26 Y27 Y28 Y29 Y30 Y31 Y32 Y33 Y34 Y35 Y36 Y37 Y38 Y39 Y40 Y41 Y42 Y43 Y44 Y45 Y46 Y47 Y48 Y49 Y50 Y51 Y52 Y53 Y54 Y55 Y56 Y57 Y58 Y59 Y60 Y61 Y62 Y63 Y64 Y65 Y66 Y67 Y68 Y69 Y70 Y71 Y72 Y73 Y74 Y75 Y76 Y77 Y78 Y79 Y80 Y81 Y82 Y83 Y84 Y85 Y86 Y87 Y88 Y89 Y90 Y91 Y92 Y93 Y94 Y95 Y96 Y97 Y98 Y99 Y100	LOCATION 12C4 13F4 14B4 15D4 16F4 17B4 18D4 19F4 1AB4 1BC4 1CD4 1DE4 1EF4 1FB4 1FC4 1FD4 1FE4 1FF4 1AG4 1AH4 1AI4 1AJ4 1AK4 1AL4 1AM4 1AN4 1AO4 1AP4 1AQ4 1AR4 1AS4 1AT4 1AU4 1AV4 1AW4 1AX4 1AY4 1AZ4 1BA4 1BB4 1BC4 1BD4 1BE4 1BF4 1BG4 1BH4 1BI4 1BJ4 1BK4 1BL4 1BM4 1BN4 1BO4 1BP4 1BQ4 1BR4 1BS4 1BT4 1BU4 1BV4 1BW4 1BX4 1BY4 1BZ4 1CA4 1CB4 1CC4 1CD4 1CE4 1CF4 1CG4 1CH4 1CI4 1CJ4 1CK4 1CL4 1CM4 1CN4 1CO4 1CP4 1CQ4 1CR4 1CS4 1CT4 1CU4 1CV4 1CW4 1CX4 1CY4 1CZ4 1DA4 1DB4 1DC4 1DD4 1DE4 1DF4 1DG4 1DH4 1DI4 1DJ4 1DK4 1DL4 1DM4 1DN4 1DO4 1DP4 1DQ4 1DR4 1DS4 1DT4 1DU4 1DV4 1DW4 1DX4 1DY4 1DZ4 1EA4 1EB4 1EC4 1ED4 1EE4 1EF4 1EG4 1EH4 1EI4 1EJ4 1EK4 1EL4 1EM4 1EN4 1EO4 1EP4 1EQ4 1ER4 1ES4 1ET4 1EU4 1EV4 1EW4 1EX4 1EY4 1EZ4 1FA4 1FB4 1FC4 1FD4 1FE4 1FF4 1FG4 1FH4 1FI4 1FJ4 1FK4 1FL4 1FM4 1FN4 1FO4 1FP4 1FQ4 1FR4 1FS4 1FT4 1FU4 1FV4 1FW4 1FX4 1FY4 1FZ4 1GA4 1GB4 1GC4 1GD4 1GE4 1GF4 1GG4 1GH4 1GI4 1GJ4 1GK4 1GL4 1GM4 1GN4 1GO4 1GP4 1GQ4 1GR4 1GS4 1GT4 1GU4 1GV4 1GW4 1GX4 1GY4 1GZ4 1HA4 1HB4 1HC4 1HD4 1HE4 1HF4 1HG4 1HH4 1HI4 1HJ4 1HK4 1HL4 1HM4 1HN4 1HO4 1HP4 1HQ4 1HR4 1HS4 1HT4 1HU4 1HV4 1HW4 1HX4 1HY4 1HZ4 1IA4 1IB4 1IC4 1ID4 1IE4 1IF4 1IG4 1IH4 1IJ4 1IK4 1IL4 1IM4 1IN4 1IO4 1IP4 1IQ4 1IR4 1IS4 1IT4 1IU4 1IV4 1IW4 1IX4 1IY4 1IZ4 1JA4 1JB4 1JC4 1JD4 1JE4 1JF4 1JG4 1JH4 1JI4 1JJ4 1JK4 1JL4 1JM4 1JN4 1JO4 1JP4 1JQ4 1JR4 1JS4 1JT4 1JU4 1JV4 1JW4 1JX4 1JY4 1JZ4 1KA4 1KB4 1KC4 1KD4 1KE4 1KF4 1KG4 1KH4 1KI4 1KJ4 1KK4 1KL4 1KM4 1KN4 1KO4 1KP4 1KQ4 1KR4 1KS4 1KT4 1KU4 1KV4 1KW4 1KX4 1KY4 1KZ4 1LA4 1LB4 1LC4 1LD4 1LE4 1LF4 1LG4 1LH4 1LI4 1LJ4 1LK4 1LL4 1LM4 1LN4 1LO4 1LP4 1LQ4 1LR4 1LS4 1LT4 1LU4 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1TP4 1TQ4 1TR4 1TS4 1TT4 1TU4 1TV4 1TW4 1TX4 1TY4 1TZ4 1UA4 1UB4 1UC4 1UD4 1UE4 1UF4 1UG4 1UH4 1UI4 1UJ4 1UK4 1UL4 1UM4 1UN4 1UO4 1UP4 1UQ4 1UR4 1US4 1UT4 1UU4 1UV4 1UW4 1UX4 1UY4 1UZ4 1VA4 1VB4 1VC4 1VD4 1VE4 1VF4 1VG4 1VH4 1VI4 1VJ4 1VK4 1VL4 1VM4 1VN4 1VO4 1VP4 1VQ4 1VR4 1VS4 1VT4 1VU4 1VV4 1VW4 1VX4 1VY4 1VZ4 1WA4 1WB4 1WC4 1WD4 1WE4 1WF4 1WG4 1WH4 1WI4 1WJ4 1WK4 1WL4 1WM4 1WN4 1WO4 1WP4 1WQ4 1WR4 1WS4 1WT4 1WU4 1WV4 1WW4 1WX4 1WY4 1WZ4 1XA4 1XB4 1XC4 1XD4 1XE4 1XF4 1XG4 1XH4 1XI4 1XJ4 1XK4 1XL4 1XM4 1XN4 1XO4 1XP4 1XQ4 1XR4 1XS4 1XT4 1XU4 1XV4 1XW4 1XX4 1XY4 1XZ4 1YA4 1YB4 1YC4 1YD4 1YE4 1YF4 1YG4 1YH4 1YI4 1YJ4 1YK4 1YL4 1YM4 1YN4 1YO4 1YP4 1YQ4 1YR4 1YS4 1YT4 1YU4 1YV4 1YW4 1YX4 1YY4 1YZ4 1ZA4 1ZB4 1ZC4 1ZD4 1ZE4 1ZF4 1ZG4 1ZH4 1ZI4 1ZJ4 1ZK4 1ZL4 1ZM4 1ZN4 1ZO4 1ZP4 1ZQ4 1ZR4 1ZS4 1ZT4 1ZU4 1ZV4 1ZW4 1ZX4 1ZY4 1ZZ4	SYMBOL Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y20 Y21 Y22 Y23 Y24 Y25 Y26 Y27 Y28 Y29 Y30 Y31 Y32 Y33 Y34 Y35 Y36 Y37 Y38 Y39 Y40 Y41 Y42 Y43 Y44 Y45 Y46 Y47 Y48 Y49 Y50 Y51 Y52 Y53 Y54 Y55 Y56 Y57 Y58 Y59 Y60 Y61 Y62 Y63 Y64 Y65 Y66 Y67 Y68 Y69 Y70 Y71 Y72 Y73 Y74 Y75 Y76 Y77 Y78 Y79 Y80 Y81 Y82 Y83 Y84 Y85 Y86 Y87 Y88 Y89 Y90 Y91 Y92 Y93 Y94 Y95 Y96 Y97 Y98 Y99 Y100	LOCATION 12C4 13F4 14B4 15D4 16F4 17B4 18D4 19F4 1AB4 1BC4 1CD4 1DE4 1EF4 1FB4 1FC4 1FD4 1FE4 1FF4 1AG4 1AH4 1AI4 1AJ4 1AK4 1AL4 1AM4 1AN4 1AO4 1AP4 1AQ4 1AR4 1AS4 1AT4 1AU4 1AV4 1AW4 1AX4 1AY4 1AZ4 1BA4 1BB4 1BC4 1BD4 1BE4 1BF4 1BG4 1BH4 1BI4 1BJ4 1BK4 1BL4 1BM4 1BN4 1BO4 1BP4 1BQ4 1BR4 1BS4 1BT4 1BU4 1BV4 1BW4 1BX4 1BY4 1BZ4 1CA4 1CB4 1CC4 1CD4 1CE4 1CF4 1CG4 1CH4 1CI4 1CJ4 1CK4 1CL4 1CM4 1CN4 1CO4 1CP4 1CQ4 1CR4 1CS4 1CT4 1CU4 1CV4 1CW4 1CX4 1CY4 1CZ4 1DA4 1DB4 1DC4 1DD4 1DE4 1DF4 1DG4 1DH4 1DI4 1DJ4 1DK4 1DL4 1DM4 1DN4 1DO4 1DP4 1DQ4 1DR4 1DS4 1DT4 1DU4 1DV4 1DW4 1DX4 1DY4 1DZ4 1EA4 1EB4 1EC4 1ED4 1EE4 1EF4 1EG4 1EH4 1EI4 1EJ4 1EK4 1EL4 1EM4 1EN4 1EO4 1EP4 1EQ4 1ER4 1ES4 1ET4 1EU4 1EV4 1EW4 1EX4 1EY4 1EZ4 1FA4 1FB4 1FC4 1FD4 1FE4 1FF4 1FG4 1FH4 1FI4 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1UW4 1UX4 1UY4 1UZ4 1VA4 1VB4 1VC4 1VD4 1VE4 1VF4 1VG4 1VH4 1VI4 1VJ4 1VK4 1VL4 1VM4 1VN4 1VO4 1VP4 1VQ4 1VR4 1VS4 1VT4 1VU4 1VV4 1VW4 1VX4 1VY4 1VZ4 1WA4 1WB4 1WC4 1WD4 1WE4 1WF4 1WG4 1WH4 1WI4 1WJ4 1WK4 1WL4 1WM4 1WN4 1WO4 1WP4 1WQ4 1WR4 1WS4 1WT4 1WU4 1WV4 1WW4 1WX4 1WY4 1WZ4 1XA4 1XB4 1XC4 1XD4 1XE4 1XF4 1XG4 1XH4 1XI4 1XJ4 1XK4 1XL4 1XM4 1XN4 1XO4 1XP4 1XQ4 1XR4 1XS4 1XT4 1XU4 1XV4 1XW4 1XX4 1XY4 1XZ4 1YA4 1YB4 1YC4 1YD4 1YE4 1YF4 1YG4 1YH4 1YI4 1YJ4 1YK4 1YL4 1YM4 1YN4 1YO4 1YP4 1YQ4 1YR4 1YS4 1YT4 1YU4 1YV4 1YW4 1YX4 1YY4 1YZ4 1ZA4 1ZB4 1ZC4 1ZD4 1ZE4 1ZF4 1ZG4 1ZH4 1ZI4 1ZJ4 1ZK4 1ZL4 1ZM4 1ZN4 1ZO4 1ZP4 1ZQ4 1ZR4 1ZS4 1ZT4 1ZU4 1ZV4 1ZW4 1ZX4 1ZY4 1ZZ4	SYMBOL Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y20 Y21 Y22 Y23 Y24 Y25 Y26 Y27 Y28 Y29 Y30 Y31 Y32 Y33 Y34 Y35 Y36 Y37 Y38 Y39 Y40 Y41 Y42 Y43 Y44 Y45 Y46 Y47 Y48 Y49 Y50 Y51 Y52 Y53 Y54 Y55 Y56 Y57 Y58 Y59 Y60 Y61 Y62 Y63 Y64 Y65 Y66 Y67 Y68 Y69 Y70 Y71 Y72 Y73 Y74 Y75 Y76 Y77 Y78 Y79 Y80 Y81 Y82 Y83 Y84 Y85 Y86 Y87 Y88 Y89 Y90 Y91 Y92 Y93 Y94 Y95 Y96 Y97 Y98 Y99 Y100	LOCATION 12C4 13F4 14B4 15D4 16F4 17B4 18D4 19F4 1AB4 1BC4 1CD4 1DE4 1EF4 1FB4 1FC4 1FD4 1FE4 1FF4 1AG4 1AH4 1AI4 1AJ4 1AK4 1AL4 1AM4 1AN4 1AO4 1AP4 1AQ4 1AR4 1AS4 1AT4 1AU4 1AV4 1AW4 1AX4 1AY4 1AZ4 1BA4 1BB4 1BC4 1BD4 1BE4 1BF4 1BG4 1BH4 1BI4 1BJ4 1BK4 1BL4 1BM4 1BN4 1BO4 1BP4 1BQ4 1BR4 1BS4 1BT4 1BU4 1BV4 1BW4 1BX4 1BY4 1BZ4 1CA4 1CB4 1CC4 1CD4 1CE4 1CF4 1CG4 1CH4 1CI4 1CJ4 1CK4 1CL4 1CM4 1CN4 1CO4 1CP4 1CQ4 1CR4 1CS4 1CT4 1CU4 1CV4 1CW4 1CX4 1CY4 1CZ4 1DA4 1DB4 1DC4 1DD4 1DE4 1DF4 1DG4 1DH4 1DI4 1DJ4 1DK4 1DL4 1DM4 1DN4 1DO4 1DP4 1DQ4 1DR4 1DS4 1DT4 1DU4 1DV4 1DW4 1DX4 1DY4 1DZ4 1EA4 1EB4 1EC4 1ED4 1EE4 1EF4 1EG4 1EH4 1EI4 1EJ4 1EK4 1EL4 1EM4 1EN4 1EO4 1EP4 1EQ4 1ER4 1ES4 1ET4 1EU4 1EV4 1EW4 1EX4 1EY4 1EZ4 1FA4 1FB4 1FC4 1FD4 1FE4 1FF4 1FG4 1FH4 1FI4 1FJ4 1FK4 1FL4 1FM4 1FN4 1FO4 1FP4 1FQ4 1FR4 1FS4 1FT4 1FU4 1FV4 1FW4 1FX4 1FY4 1FZ4 1GA4 1GB4 1GC4 1GD4 1GE4 1GF4 1GG4 1GH4 1GI4 1GJ4 1GK4 1GL4 1GM4 1GN4 1GO4 1GP4 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**OPTIONS IN EFFECT* TO=FCIO, SOURCE=POLIST, DECK=NOL, IAL=MAP
**OPTIONS IN EFFECT* NAME=PLUCL • LINECL= 75
**STATISTICS* SOURCE=STATISTICS= 23, PROGRAM SIZE= 100
**STATISTICS* NO DIAGNOSTICS GENERATED

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14/11/55

DATE = 80142

PURDUE / LAPS 3031

READCC

FORTRAN IV G LEVEL 21

FILE PLOT

SYMBOL MO MOS CATNAM CMEANS LABELS SK	LOCATION 10 14 28 4248 4780 C42C	SYMBOL MOCC ICC DCUN LHLCSS LHLCST	COMMON BLOCK / CC LOCATION 4 18 78 4288 A78C C484	SYMBOL NOCAT ICLUNT IDOTS PA BETA	MAP SIZE LOCATION 8 1C 7C 4500 A7EC	C4A2	SYMBOL ITOTDT IDUNT CVOLPT HAP OBETA	LOCATION C 20 41CC 46FB 414C	SYMBOL MOU4 IOUT ALP4P DOTDT SLK	LOCATION 10 24 4100 4770 4A4C
SYMBOL CC-ENS	LOCATION 1	SYMBOL CCVHIN	COMMON BLOCK / CLASY LOCATION 790	SYMBOL CCVLT	MAP SIZE LOCATION 7F80	M070	SYMBOL CUCON	LOCATION 7FF6	SYMBOL	LOCATION
SYMBOL IACON*	LOCATION 14	SYMBOL	SUBPROGRAMS CALLED LOCATION	SYMBOL	LOCATION		SYMBOL	LOCATION	SYMBOL	LOCATION
SYMBOL I	LOCATION 14	SYMBOL J	SCALAR MAP LOCATION DC	SYMBOL INDEX	LOCATION F0		SYMBOL LAST	LOCATION E4	SYMBOL	LOCATION
SYMBOL 1 614	LOCATION 14 145	SYMBOL 101	FORMAT STATEMENT MAP LOCATION 104	SYMBOL 102	LOCATION 143		SYMBOL 103	LOCATION 15A	SYMBOL 104	LOCATION 17C

\*OPTIONS IN EFFECT\* I06-ACUIC\*SOURCE\*NO LIST\*DECK\*NO LQADJ\*MAP  
 \*OPTIONS IN EFFECT\* NAME = READCC , LINECNT = 75  
 \*STATISTICS\* SOURCE STATEMENTS = 31, PROGRAM SIZE = 1274  
 \*STATISTICS\* NO DIAGNOSTICS GENERATED



14/11/55

DATE = 80142

GETCC

FORTRAN IV G LEVEL 21

FILE PLOT

PURDUE / LARS 3031

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0001      SUBROUTINE GETCC
0002      C PURPOSE: FILL ONE SET OF CLASY VALUES USING 'ICC' AS AN INDEX
0003      C
0004      C COMMON /CC/ MU, NOCC, NOCAT, ITOIT, WQP4, MOS, ICC,
0005      C 1 ICLUNT, ICLUNT, IOUT, CATNAM(20), DCON,
0006      C 2 ICLUNT(20,20), CVLRT, WLPRT( 30), CMEANS(16), CVRTIN(15),
0007      C 3 PACT(20,20), BAP(30), DOTUT(16), LAHEL(30), LRLCSS(30),
0008      C 4 HETA(20,30), OBETA(20,30), SLK(20,30), SK(30), LRLCST(30),
0009      C LOGICAL*1 LAHEL, LRLCSS, LRLCST, LINE, ISYMBL
0010      C COMMON/CLASY/ CMENS(16,30),CCVHIN(256,30),CCVLT(30),CDCON(30)
0011      C
0012      WELPPP = RLPWP(ICC)
0013      C
0014      CVLRT = CCVLT(ICC)
0015      C
0016      DO 10 I = 1,16
0017      CMEANS(I) = CMENS(I,ICC)
0018      C
0019      DO 20 J = 1,158
0020      CVRTIN(J) = CCVRTIN(J,ICC)
0021      CDCON = CDCON(ICC)
0022      C
0023      RETURN
0024      EN

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GETCC

FORTRAN IV G LEVEL 21

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FILF PLOT

SYMBOL MOP4 MOP5 CATNAM CMFANS LABELS SK	LOCATION 0 14 28 4248 A7F0 C4CC	SYMBOL NOCC ICC DCON CVRIN LHLCSS LHLCST	COMMON BLOCK /CC LOCATION 4 18 78 4288 A7CE C484	SYMBOL NOCCAT ICLUNT IDOTS PX BETA	/ MAP SIZE LOCATION 8 7C 4500 A7EC	SYMBOL ITUTDT IDDUINT CVOLRT BAP ORETA	LOCATION C 20 41CC A7F8 H14C	SYMBOL MOP4 IOUT MLPRP DUTDT SLK	LOCATION 10 24 41D0 A770 HAAAC
SYMBOL CCMENS	LOCATION 0	SYMBOL CCVRIN	COMMON BLOCK /CLASY LOCATION 780	SYMBOL CCVLR	/ MAP SIZE LOCATION 7FA0	SYMBOL CDCON	LOCATION 7FF8	SYMBOL	LOCATION
SYMBOL METPRP	LOCATION 0	SYMBOL I	SCALAR MAP LOCATION 84	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION

\*OPTIONS IN EFFECT\* IO,ERCUTIC,SOURCE,NOLIST,DECK,NOLOAD,MAP  
 \*OPTIONS IN EFFECT\* NAME = GETCC  
 \*STATISTICS\* SOURCE STATEMENTS = 13,PROGRAM SIZE = 522  
 \*STATISTICS\* NO DIAGNOSTICS GENERATED

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DATE = 80142

MINV

FORTRAN IV G LEVEL 21

PURDUE / LARS 3031

FILE PLOT

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0001      SUBROUTINE MINV(A,B,C,VOL)
0002      THIS ROUTINE CALCULATES A=THE INVERSE OF C. A=C**-1. IT ALSO
0003      RETURNS THE DETERMINANT OF C IN VOL. THE SQUARE ARRAY
0004      B IS TEMPORARY STORAGE, AND MAY BE IDENTICAL TO C.
0005      VOL=-DABS(DET(C)) IF C IS NOT POSITIVE DEFINITE.
0006
0007      COMMON /CC/ MQ, NOCC, NOCAT, ITOTDT, MOP4, MUS, ICC,
0008      1 ICLUNT, IUDUNT, IOUT, CATNAM(20), DCUN,
0009      2 IUDTS(20,20), CVOLMT, WLRPP( 30), CMENS(16), CWIN(158),
0010      3 PA(30,20), RAP(30), UOTDT(16), LABELS(30), LBLCSS(30),
0011      4 BETA(20,30), OMTA(20,30), SLK(20,30), SK(30), LBLCST(30),
0012      LOGICAL*1 LABELS, LBLCSS, LBLCST, LINE, ISYMBL
0013
0014      REAL A(MQ,MQ), H(MQ,MQ), C(MQ,MQ)
0015      REAL*8 Z,VOLL
0016      VOLL=1.
0017      DO 11 J=1,MQ
0018      DO 10 I=1,MQ
0019      A(I,J)=C(I,J)
0020      A(I,I)=1.
0021      DO 22 J=1,MQ
0022      VOLL=VOLL*A(I,I)
0023      IF(H(I,I).LE.0.) VOLL=-DABS(VOLL)
0024      Z=1./H(I,I)
0025      DO 21 J=1,MQ
0026      H(I,J)=A(I,J)*Z
0027      DO 22 IP=1,MQ
0028      IF(IP.EQ.I) GO TO 22
0029      Z=A(IP,I)
0030      DO 23 J=1,MQ
0031      A(IP,J)=H(IP,J)-H(I,J)*Z
0032      A(I,J)=A(IP,J)-A(I,J)*Z
0033      CONTINUE
0034      VOL = VOLL
0035      RETURN
0036      END

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FILE PLOT

PURDUE / LARS 3031

COMMON BLOCK / CC		/ MAP SIZE		C442	
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
W0	14	W0CAT	1C	ITOTDT	20
W0S	24	ICLUNT	7C	ITOUT	41CC
CATNAM	244	ICLUTS	4500	RLPWP	A6FH
CAMPNS	244	PR	A7EC	DOTDT	M14C
LABELS	244	META		SLK	
SR	244				
SCALAR MAP					
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
W0LL	20	I	E0	IP	E8
W0R	20	C	F8		
ARRAY MAP					
SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
	20		F4		

- \*OPTIONS IN EFFECT\* IN EFFECTIC, SOURCE, NOLIST, DECK, NOLUAD, MAP
- \*OPTIONS IN EFFECT\* NAME = MINV, LINECNT = 75
- \*STATISTICS\* SOURCE STATEMENTS = 24, PROGRAM SIZE = 1444
- \*STATISTICS\* NO DIAGNOSTICS RELATED
- \*STATISTICS\* NO DIAGNOSTICS THIS STEP